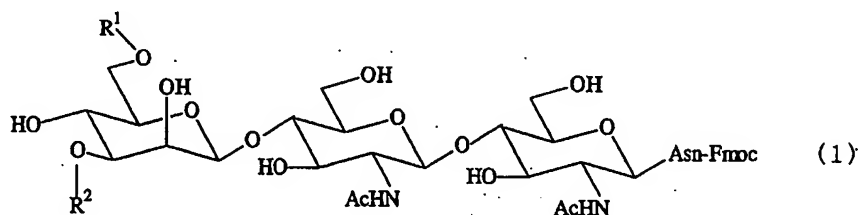


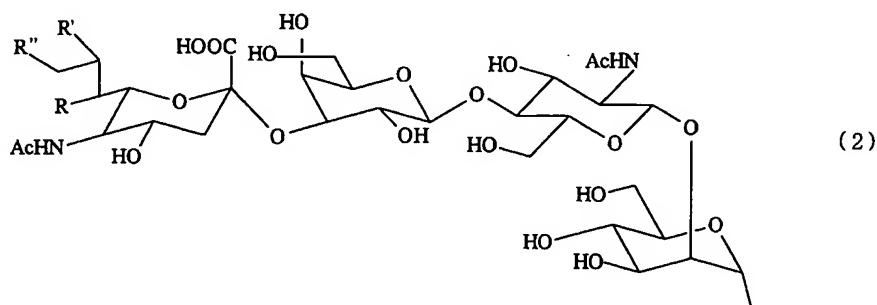
U.S. National Stage of
PCT/JP2003/016523
PRELIMINARY AMENDMENT

IN THE CLAIMS:

1. (currently amended) An asparagine-linked α 2,3-oligosaccharide derivative having undeca- to hepta-saccharides containing fluorine and represented by the formula (1) given below



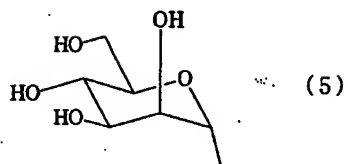
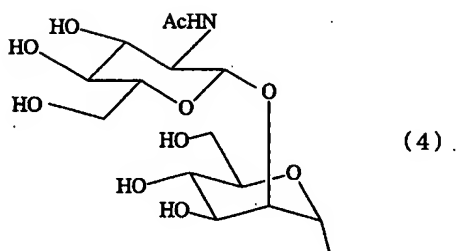
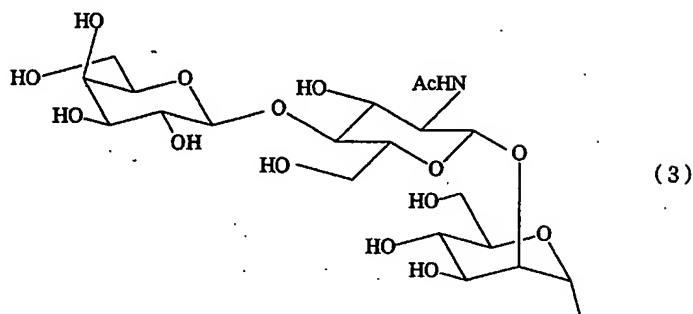
wherein R^1 and R^2 are each a hydrogen atom or one of the groups represented by the formulae (2) to (5) and may be the same or different, provided that one of R^1 and R^2 should always be the group of the formula (2) [[.]]



R , R' and R'' are in the following combinations

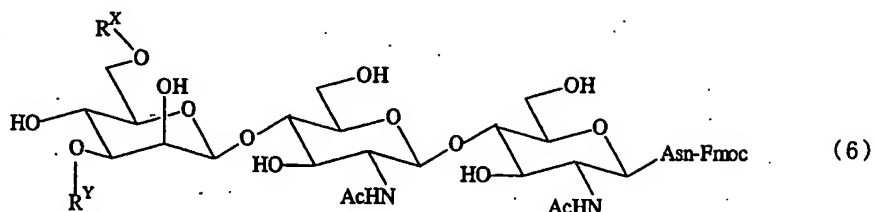
(a) $R=F$, $R'=OH$, $R''=OH$

- (b) $R=OH$, $R'=F$, $R''=OH$, and
(c) $R=OH$, $R'=OH$, $R''=F$, and
(d) $R=OH$, $R'=OH$, $R''=OH$

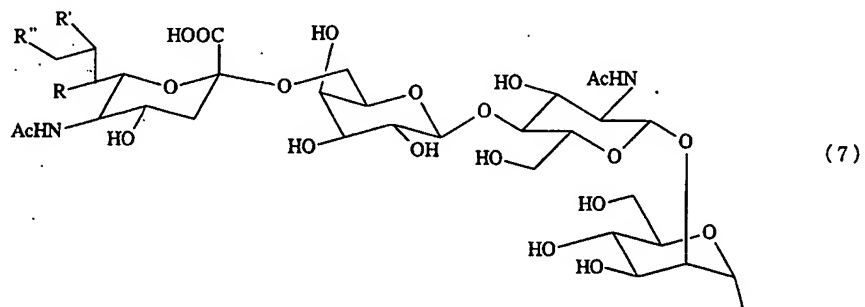


2. (currently amended) An asparagine-linked α 2,6-oligosaccharide derivative having undeca- to hepta-saccharides,

containing fluorine and represented by the formula (6) given below



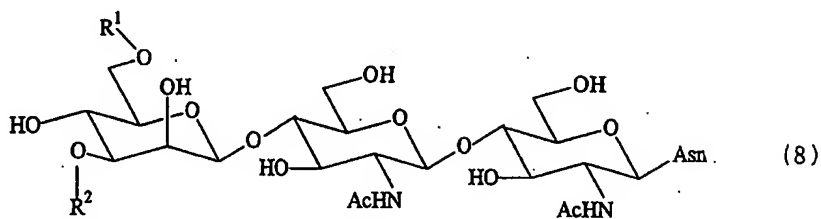
wherein R^x and R^y are each a hydrogen atom, a group represented by the formula (7) or one of the groups represented by the formulae (3) to (5) as defined in claim 1, provided that one of R^x and R^y should always be a group of the formula (7) [[.]]



R , R' and R'' are in the following combinations

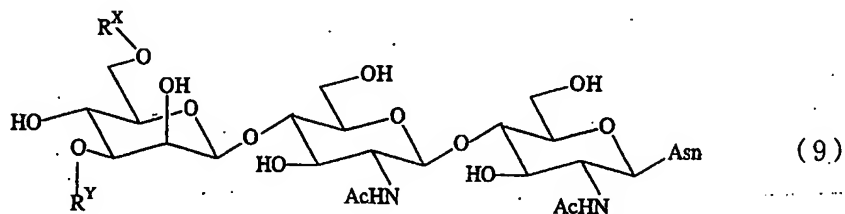
- (a) $R=F$, $R'=OH$, $R''=OH$, and
- (b) $R=OH$, $R'=F$, $R''=OH$, and
- (c) $R=OH$, $R'=OH$, $R''=F$, and

3. (currently amended) An asparagine-linked α 2,3-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (8) given below



wherein R^1 and R^2 are as ~~defined above~~ defined in claim 1.

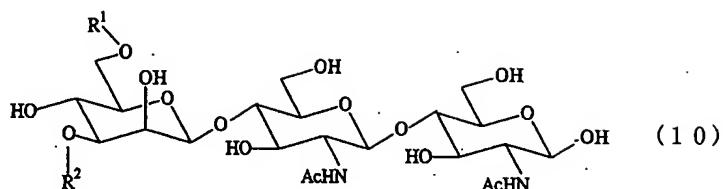
4. (currently amended) An asparagine-linked α 2,6-oligosaccharide having undeca- to hepta-saccharides, containing fluorine and represented by the formula (9) given below



wherein R^x and R^y are as ~~defined above~~ defined in claim 2.

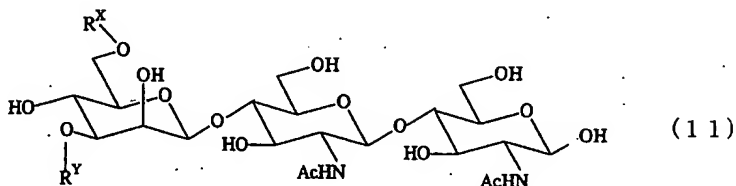
5. (currently amended) An α 2,3-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (10) given

below



wherein R¹ and R² are as ~~defined above~~ defined in claim 1.

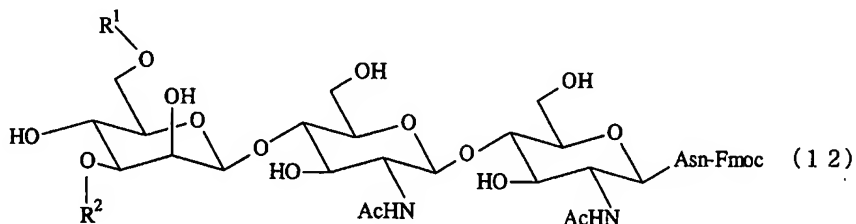
6. (currently amended) An α 2,6-oligosaccharide having undeca- to hepta-saccharides, containing fluorine and represented by the formula (11) given below



wherein R^x and R^y are as ~~defined above~~ defined in claim 2.

7. (currently amended) A process for preparing an asparagine-linked α 2,3-disialooligosaccharide derivative having undecasaccharide and represented by the formula (12) given below,

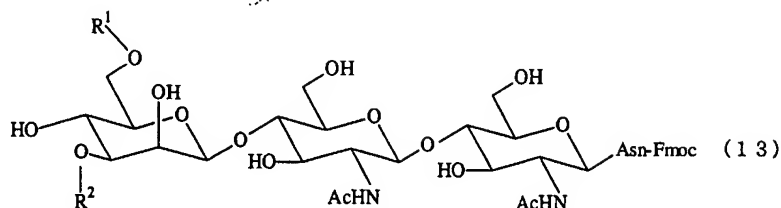
the process being characterized by transferring sialic acid or a sialic acid derivative to an asparagine-linked oligosaccharide protected with a lipophilic protective group using a sialic acid transferase, and subjecting the resulting asparagine-linked oligosaccharide protected with a lipophilic protective group to chromatography for separation



wherein R¹ and R² are each a group represented by the formula (2) as defined in claim 1.

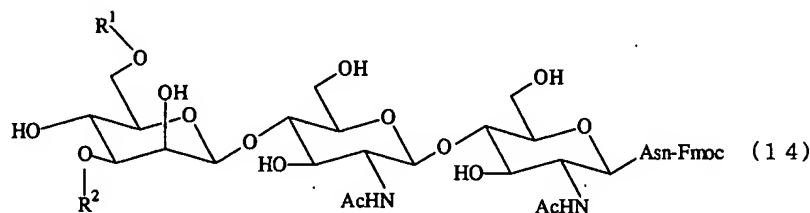
8. (currently amended) A process for preparing an asparagine-linked α 2,3-monosialooligosaccharide derivative having decasaccharide and represented by the formula (13) given below, the process being characterized by transferring sialic acid or a sialic acid derivative to an asparagine-linked oligosaccharide protected with a lipophilic protective group using a sialic acid transferase, and subjecting the resulting asparagine-linked oligosaccharide

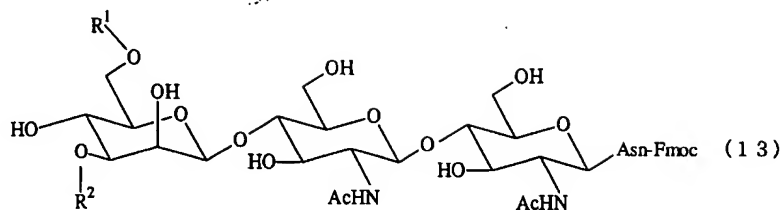
protected with a lipophilic protective group to chromatography for separation



wherein one of R¹ and R² is a group represented by the formula (2), and the other thereof is a group represented by the formula (3), wherein formula (2) and formula (3) are as defined in claim 1.

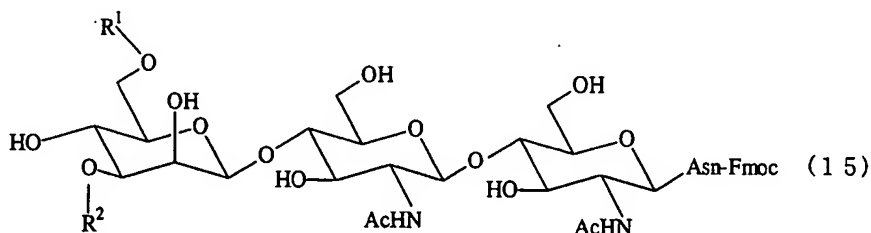
9. (currently amended) A process for preparing an asparagine-linked α 2,3-monosialooligosaccharide derivative having nonasaccharide and represented by the formula (14) given below, the process being characterized by hydrolyzing an asparagine-linked monosialooligosaccharide derivative represented by the formula (13) using a ~~galactose hydrolase~~ galactosidase

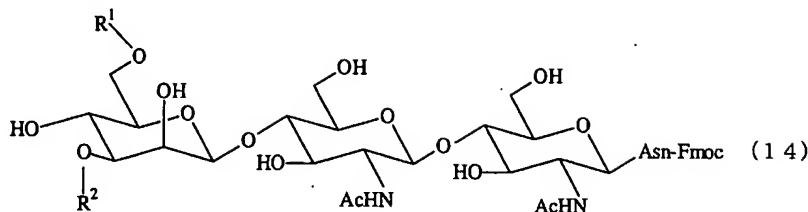




wherein one of R¹ and R² is a group represented by the formula (2),
and the other thereof is a group represented by the formula (4),
wherein formula (2) and formula (4) are as defined in claim 1.

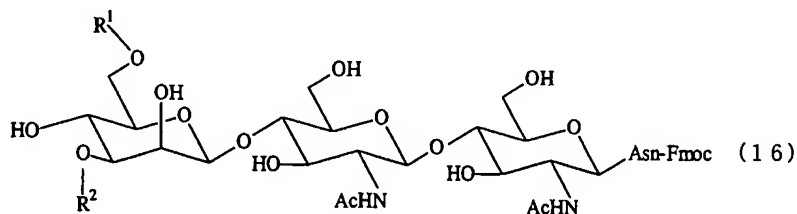
10. (currently amended) A process for preparing an asparagine-linked α 2,3-monosialooligosaccharide derivative having octasaccharide and represented by the formula (15) given below, the process being characterized by hydrolyzing an asparagine-linked monosialooligosaccharide derivative represented by the formula (14) using an ~~N-acetylglucosamin hydrolase~~ N-acetylglucosaminidase

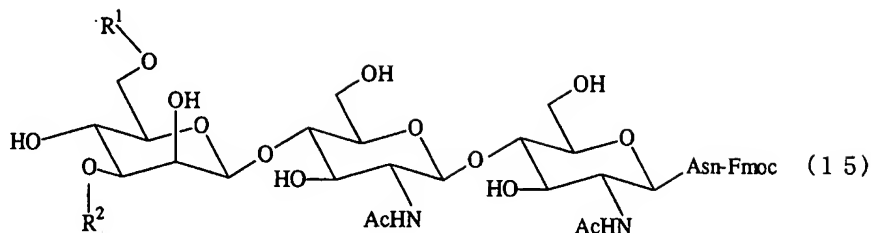




wherein one of R¹ and R² is a group represented by the formula (2),
and the other thereof is a group represented by the formula (5),
wherein formula (2) and formula (5) are as defined in claim 1.

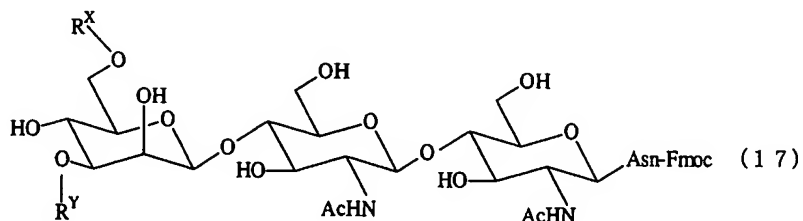
11. (currently amended) A process for preparing an asparagine-linked α 2,3-monosialooligosaccharide derivative having heptasaccharide and represented by the formula (16) given below, the process being characterized by hydrolyzing an asparagine-linked monosialooligosaccharide derivative represented by the formula (15) using a ~~mannos hydrolase~~ mannosidase





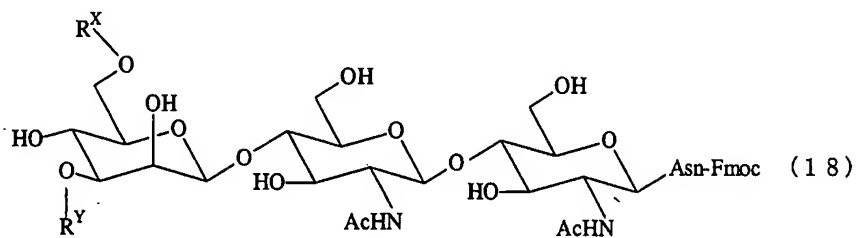
wherein one of R¹ and R² is a group represented by the formula (2).
as defined in claim 1, and the other thereof is a hydrogen atom.

12. (currently amended) A process for preparing an asparagine-linked α 2,6-disialooligosaccharide derivative having undecasaccharide and represented by the formula (17) given below, the process being characterized by transferring sialic acid or a sialic acid derivative to an asparagine-linked oligosaccharide protected with a lipophilic protective group using a sialic acid transferase, and subjecting the resulting asparagine-linked oligosaccharide protected with a lipophilic protective group to chromatography for separation

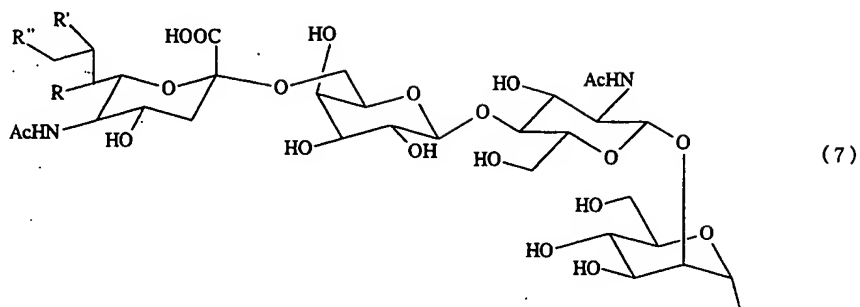


wherein R^x and R^y are each a group represented by the formula (7)
as defined in claim 2.

13. (currently amended) A process for preparing an asparagine-linked $\alpha 2,6$ -monosialooligosaccharide derivative having decasaccharide and represented by the formula (18) given below, the process being characterized by transferring sialic acid or a sialic acid derivative to an asparagine-linked oligosaccharide protected with a lipophilic protective group using a sialic acid transferase, and subjecting the resulting asparagine-linked oligosaccharide protected with a lipophilic protective group to chromatography for separation



wherein one of R^x and R^y is a group represented by the formula (7),



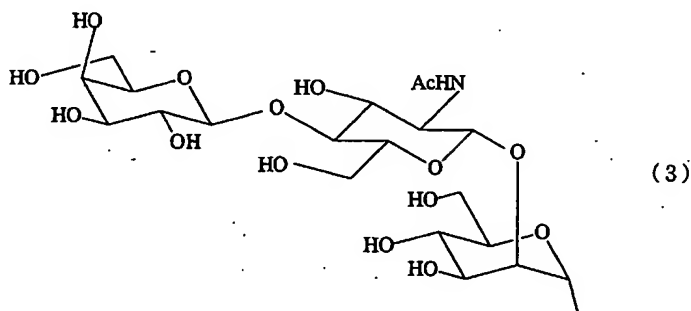
R, R' and R'' are in the following combinations

(a) R=F, R'=OH, R''=OH,

(b) R=OH, R'=F, R''=OH, and

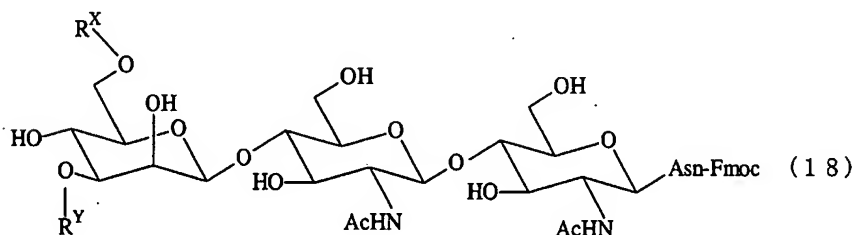
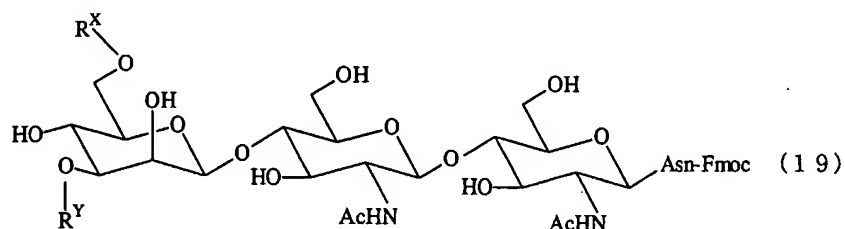
(c) R=OH, R'=OH, R''=F,

and the other thereof is a group represented by the formula (3)

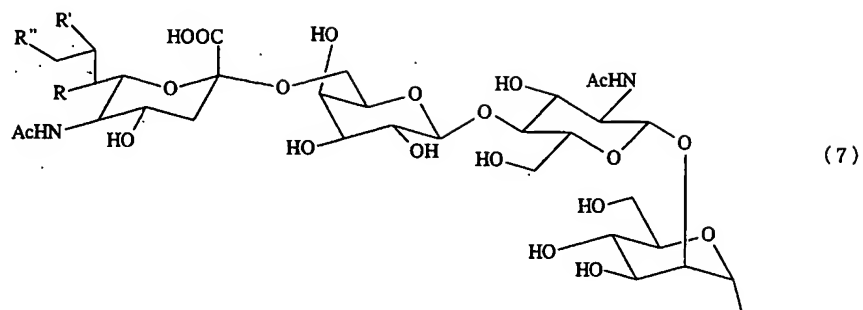


14. (currently amended) A process for preparing an asparagine-

linked α 2,6-monosialooligosaccharide derivative having nonasaccharide and represented by the formula (19) given below, the process being characterized by hydrolyzing an asparagine-linked monosialooligosaccharide derivative represented by the formula (18) using a ~~galactosyl hydrolase~~ galactosidase



wherein one of R^X and R^Y is a group represented by the formula (7)



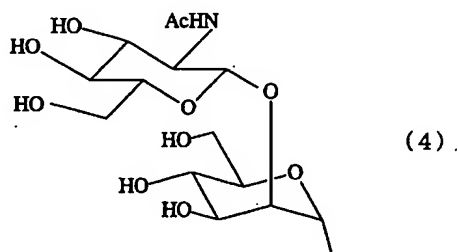
R, R' and R'' are in the following combinations

(a) R=F, R'=OH, R''=OH,

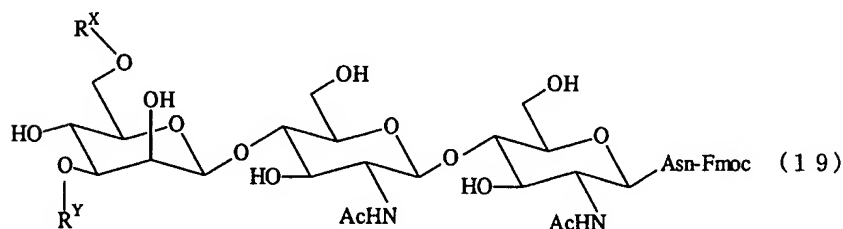
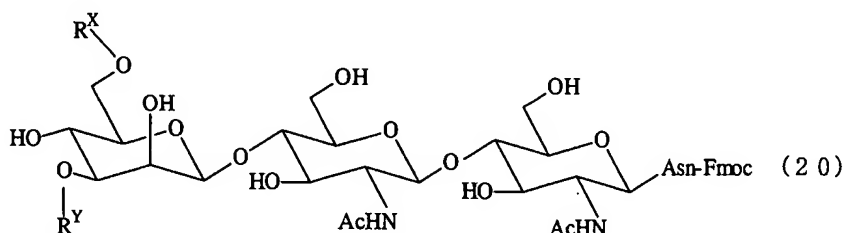
(b) R=OH, R'=F, R''=OH, and

(c) R=OH, R'=OH, R''=F,

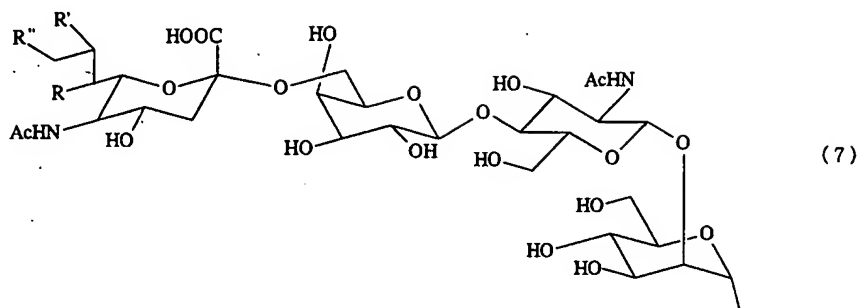
and the other thereof is a group represented by the formula (4)



15. (currently amended) A process for preparing an asparagine-linked α 2,6-monosialooligosaccharide derivative having octasaccharide and represented by the formula (20) given below, the process being characterized by hydrolyzing an asparagine-linked monosialooligosaccharide derivative represented by the formula (19) using an ~~N-acetylglucosamin hydrolase~~ N-acetylglucosaminidase



wherein one of R^X and R^Y is a group represented by the formula (7)



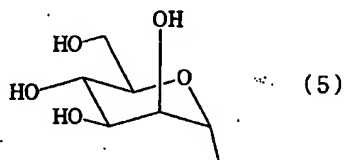
R, R' and R'' are in the following combinations

(a) R=F, R'=OH, R''=OH,

(b) R=OH, R'=F, R''=OH, and

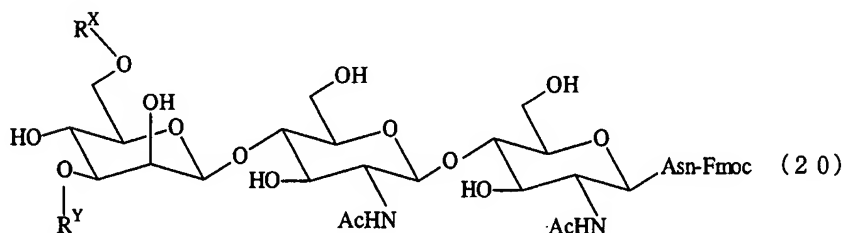
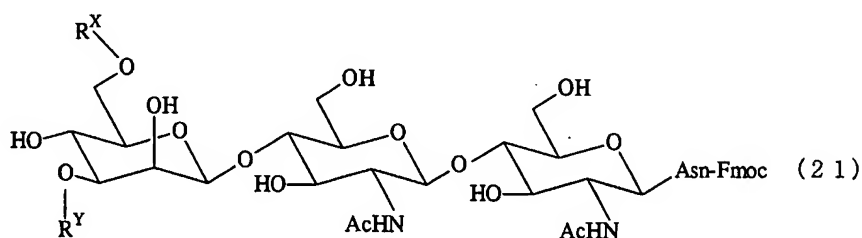
(c) R=OH, R'=OH, R''=F,

and the other thereof is a group represented by the formula (5)



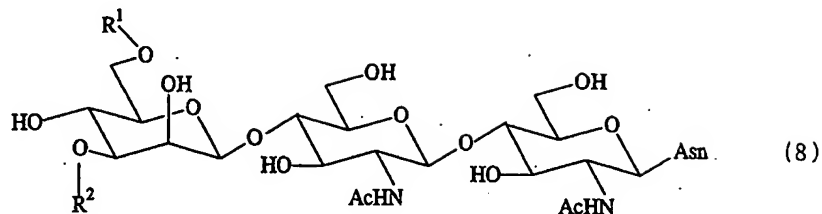
16. (currently amended) A process for preparing an asparagine-linked α 2,6-monosialooligosaccharide derivative having

heptasaccharide and represented by the formula (21) given below,
the process being characterized by hydrolyzing an asparagine-linked
monosialooligosaccharide derivative represented by the formula (20)
using a ~~mannos-hydrolase~~ mannosidase

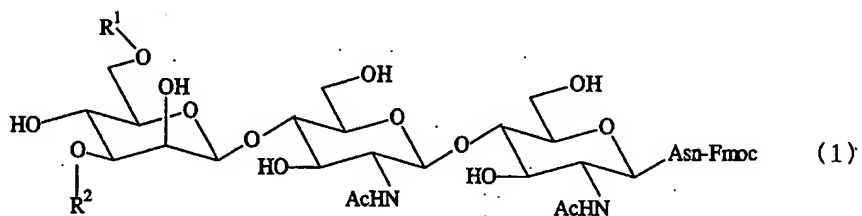


wherein one of R^x and R^y is a group represented by the formula (7)
as defined in claim 2, and the other thereof is a hydrogen atom.

17. (currently amended) A process for preparing an
aspareagine-linked α2,3-oligosaccharide having undeca- to hepta-
saccharides and represented by the formula (8)

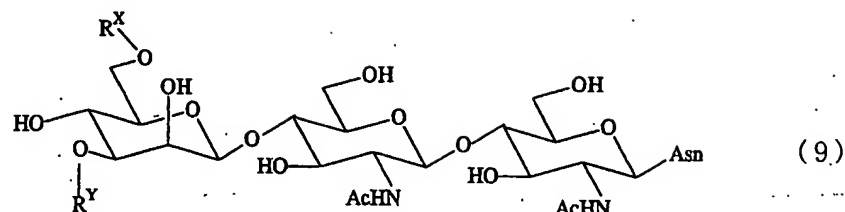


the process being characterized by removing the protective group from an asparagine-linked α 2,3-oligosaccharide derivative having undeca- to hepta-saccharides and represented by the formula (1)

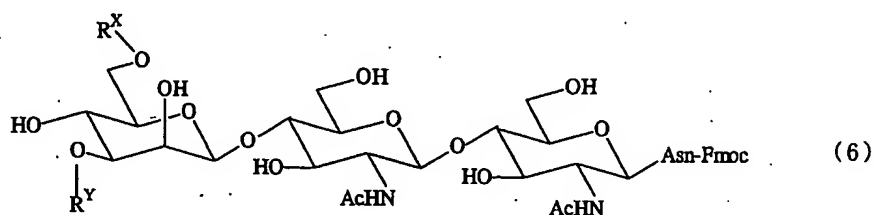


wherein R¹ and R² in formula (8) and formula (1) are as defined in claim 1.

18. (currently amended) A process for preparing an aspareagine-linked α 2,6-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (9)

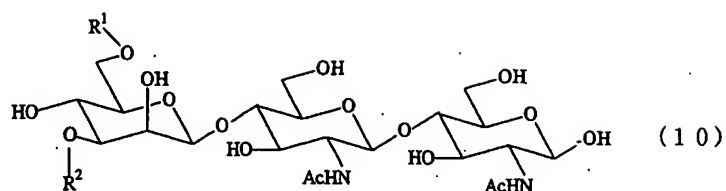


the process being characterized by removing the protective group from an asparagine-liked α 2,6-oligosaccharide derivative having undeca- to hepta-saccharides and represented by the formula (6)

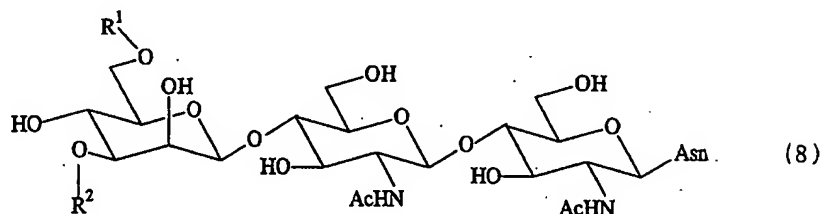


wherein R^X and R^Y in formula (9) and formula (6) are as defined in claim 2.

19. (currently amended) A process for preparing an α 2,3-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (10)

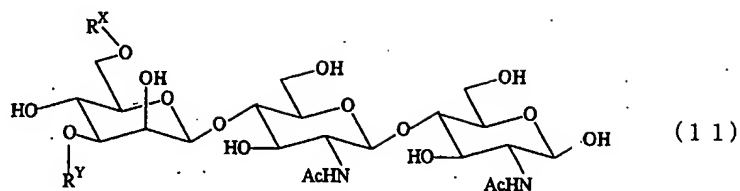


the process being characterized by removing the asparagine residue from an asparagine-liked α 2,3-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (8)

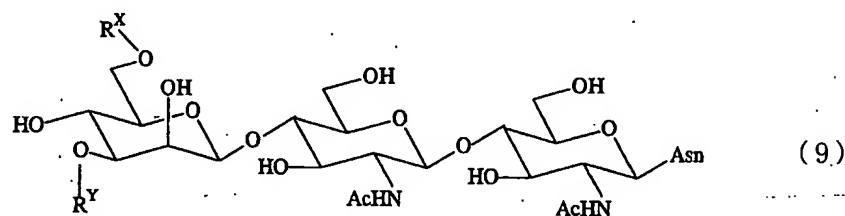


wherein R¹ and R² in formula (10) and formula (8) are as defined in claim 1.

20. (currently amended) A process for preparing an α 2,6-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (11)

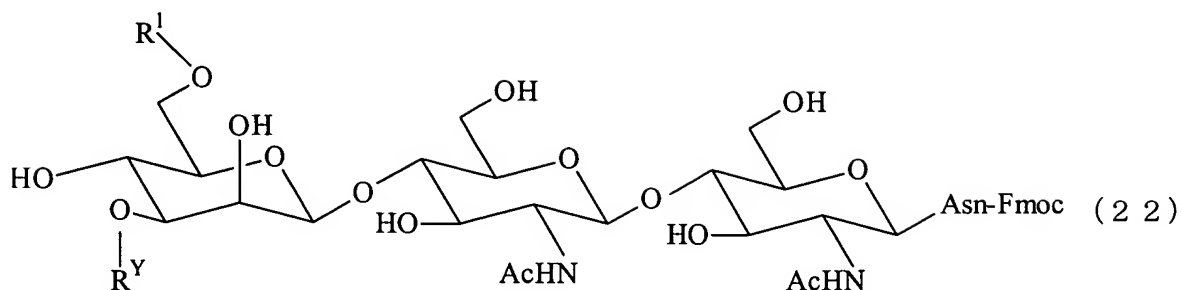


the process being characterized by removing the asparagine residue from an asparagine-linked α 2,6-oligosaccharide having undeca- to hepta-saccharides and represented by the formula (9)



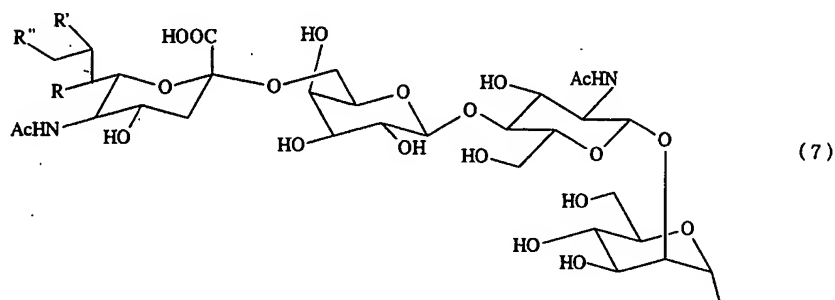
wherein R^X and R^Y in formula (11) and formula (9) are as defined in claim 2.

21. (currently amended) An asparagine-linked (α 2,3) (α 2,6)-oligosaccharide derivative having undecasaccharides containing fluorine and represented by the formula (22) given below



(22)

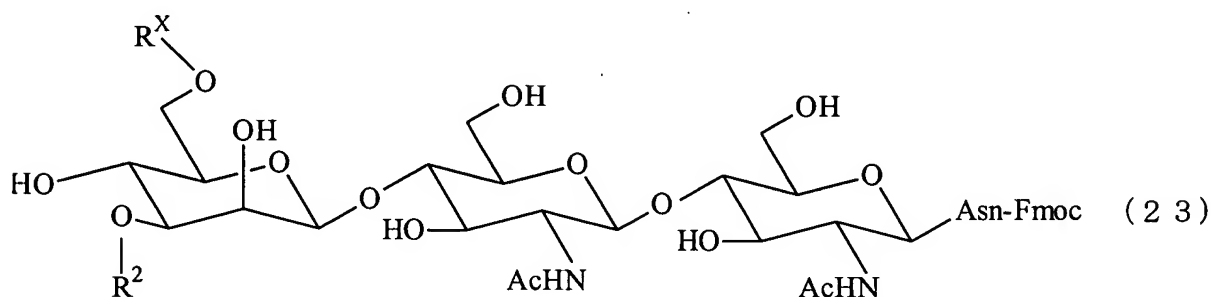
wherein R¹ is a group represented by the formula (2) as defined in claim 1, R^Y is a group represented by the formula (7) below[[.]]



R, R' and R'' are in the following combinations

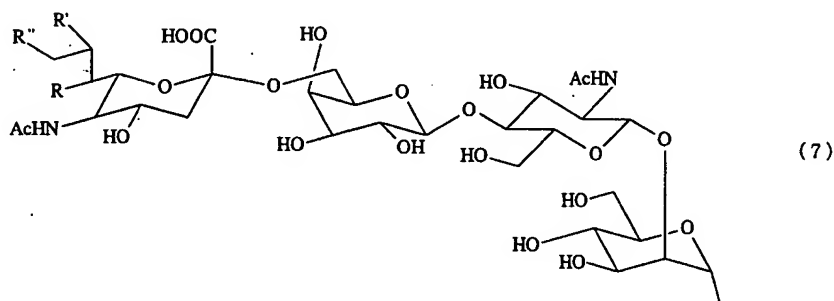
- (a) R=F, R'=OH, R''=OH,
- (b) R=OH, R'=F, R''=OH, and
- (c) R=OH, R'=OH, R''=F
- ~~(d) R=OH, R'=OH, R''=OH.~~

22. (currently amended) An asparagine-linked (α 2,3) (α 2,6)-oligosaccharide derivative having undecasaccharides containing fluorine and represented by the formula (23) given below



(23)

wherein R^2 is a group represented by the formula (2) as defined in claim 1, R^X is a group represented by the formula (7) below.



R , R' and R'' are in the following combinations

(a) $R=F$, $R'=OH$, $R''=OH$, and

(b) $R=OH$, $R'=F$, $R''=OH$, and

(c) $R=OH$, $R'=OH$, $R''=F$

~~(d) $R=OH$, $R'=OH$, $R''=OH$.~~

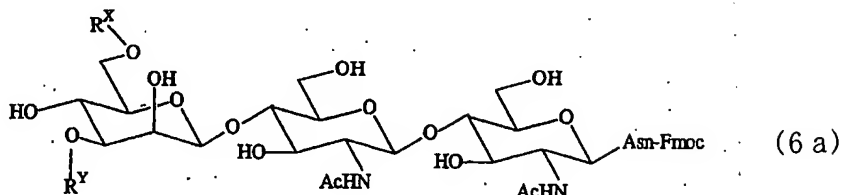
23. (canceled)

24. (currently amended) An asparagine-linked oligosaccharide derivative containing at least one fucose in N-acetylglucosamine on the nonreducing terminal side of the asparagine-linked $\alpha 2,3$ -oligosaccharide derivative having undeca- to hepta-saccharides containing fluorine and represented by the formula (1) as defined in claim 1.

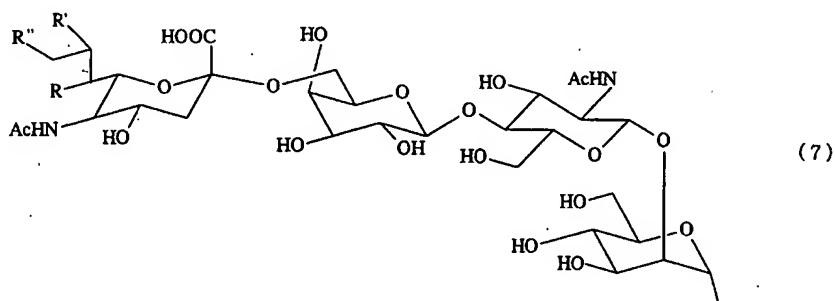
25. (currently amended) An asparagine-linked oligosaccharide derivative containing at least one fucose in N-acetylglucosamine on the nonreducing terminal side of the asparagine-linked $\alpha 2,6$ -oligosaccharide derivative having undeca- to hepta-saccharides containing fluorine and represented by the formula (6) as defined in claim 2.

26. (currently amended) An asparagine-linked oligosaccharide derivative containing at least one fucose in N-acetylglucosamine on the nonreducing terminal side of the asparagine-linked $\alpha 2,6$ -

oligosaccharide derivative having undeca- to hexa-saccharides and represented by the formula (6a) [[.]]



wherein R^x and R^y are each a hydrogen atom, a group represented by the formula (7) or one of the groups represented by the formulae (3) to (5) as defined in claim 1, provided that one of R^x and R^y should always be a group of the formula (7) or (3)



where $R = OH$, $R' = OH$ and $R'' = OH$.

27. (currently amended) A process for preparing an asparagine-linked oligosaccharide derivative containing at least one fucose in

N-acetylglucosamine on the nonreducing terminal side of an asparagine-linked oligosaccharide containing fluorine wherein the asparagine has amino group ~~nitrogen~~ protected with a lipophilic protective group and represented by the formula (1) as defined in claim 1, the process being characterized by transferring fucose to the asparagine-linked oligosaccharide wherein the asparagine has the protected amino group ~~nitrogen~~ with a lipophilic protective group using a fucose transferase, and subjecting the resulting asparagine-linked oligosaccharide protected with the lipophilic protective group to chromatography for separation.

28. (new) A process for preparing an asparagine-linked oligosaccharide derivative containing at least one fucose in N-acetylglucosamine on the nonreducing terminal side of an asparagine-linked oligosaccharide containing fluorine wherein the asparagine has amino group protected with a lipophilic protective group and represented by the formula (6) as defined in claim 2, the process being characterized by transferring fucose to the asparagine-linked oligosaccharide wherein the asparagine has the protected amino group with a lipophilic protective group using a fucose transferase, and subjecting the resulting asparagine-linked oligosaccharide protected with the lipophilic protective group to

U.S. National Stage of
PCT/JP2003/016523
PRELIMINARY AMENDMENT

PATENT

chromatography for separation.